7)

$t_m = 300ns$ $t_c = 50ns$
extime = $175ns$ accessors = 1.3

a)

$175 + 1.3 * 300 = 565$ ✓

b)

$h * t_c + (1-h) * $ miss penalty

i) $h = 0.9$

$1.3[.9 * 50 + .1 * 300] + 175$
$1.3[45 + 30] + 175 = 272.5ns$ ✓

ii) $h = 0.95$

$[.95 * 50 + .05 * 300] + 175 + 1.3$
$1.3[47.5 + 15]$ $+ 175 = 256.25$ ✓

iii) $h = 0.98$

$[.98 × 50 + .02 * 300] + 175$
$1.3[49 + 6] + 175 = 246.35 ns$ ✓

8)

$t_m = 250ns$ $access/instr = 2$

                   $instr\,ExTime = 150ns$

Base: $150 + 2[250] = 650ns$

a)

$150 + 2[125] = 400ns$ ✓

b)

$150 + 1.5[250] = 525ns$ ✓

c)

     $h = 9$ $t_c = 50$

     miss Penalty $= t_m + t_c$

$2[(.9 \times 50) + (.1 \times 300)] + 150 = 300ns$ ✓

Ranki   c, a, b.   -2

9)

$t_m = 1000\,ns$ $t_c = 100\,ns$

$h = 0.90$ Block size = 8 words

a)

$h * t_c + (1-h) * miss\ penalty$

$.9 \times 100 + .1 \times 1000 =$

$90 + 100 = 190$ ✓

b)

           to Mem   from mem   from cache

          $B \times t_m + B \times t_m + t_c$

$miss\ penalty = 8 \times 1000 + 8 \times 1000 + 100 = 16100$

$.9 \times 100 + .1 \times 16100 = 1700\,ns$ ✓

c)

i)

$miss\ Penalty = 8 \times 500 + 8 \times 500 + 100 = 8100$

$.9 \times 100 + .1 \times 8100 = 900\,ns$ ✓

ii)

$miss\ Penalty\ \tfrac{8}{4} \times 1000 + \tfrac{8}{4} \times 1000 + 100 = 4100$

$.9 \times 100 + .1 \times 4100 = 500\,ns$ ✓

the second option is better. ✓

Scanned by CamScanner

10)

a)

$(1-w)*t_c$ ✓

b)

$w*t_m$ ✓

c)

$(1-w)\left[\frac{B}{C}*t_m+t_c\right]$ ✓

d)

$w*t_m$ ✓

11)

$t_c = 100ns$ $t_m = 1000ns$

$h = .9$ $B = 8\text{ words}$ $C = 2$

a)

$h \times t_c + (1-h) \times t_m$

$.9 \times 100 + .1 \times 1000$

$90 + 100 = 190ns$ ✓

b)

$\text{miss Penalty} = (\frac{B}{2} * t_m + \frac{B}{C} * t_m) + t_c$

$= \frac{8}{2} * 1000 + \frac{8}{2} * 1000 + 100 = 8100$

$.1 \times 100 + .1 \times 1000$

$.9 * 100 + .1 * 8100 = 900ns$ ✓

c) $w = .3$ Read Hit   Write Hit b $n\ t_u$

$T_{avg} = h[(1-w)t_c + w*t_c] + \underset{(1-h)}{[(1-w)(\frac{B}{2}*t_m + \frac{B}{2}*t_m + t_c) + w*t_m]}$

$.9[.7*100 + .3*100] + \underset{.1}{[.7(\frac{8}{2}*1000 + \frac{8}{2}*1000 + 100) + .3*1000]}$

$.9[100] + .1[.5(670) + 300]$

$90 + 597 = 687ns$ ✓

12)

$t_c = 100ns \quad t_m = 1000$

$h = .95 \quad B \, 8 \quad C = 4$

a)

$h * t_c + (1-h) * t_m$

$.95 * 100 + .05 \times 1000 = 145 ns$ ✓

$\underline{95} \quad \underline{50}$

b)

miss penalty $= \frac{B}{C} * t_m + \frac{B}{C} * t_m + t_c$

$2(\frac{8}{4} \times 1000) + 100) = 4100$

$95 + .05 \times 4100$

$\underline{205} \quad = 300 ns$ ✓

c) $\quad w = .25 \quad (1-.95) = .05$

$T_{avg} = h[(1-w) t_c + w * t_c] + (1-h)[(1-w)(\frac{B}{C} * t_m + \frac{B}{C} * t_m + t_c) + w * t_m]$

$ \underset{4100}{}$

$.95[.75 \times 100 + .25 \times 100] + .05[.75(\frac{8}{4} * 1000 + \frac{8}{4} * 1000 + 100) + .25 \times 1000]$

$.95[100] + .05[3075 + 250]$

$\underline{95 + 166.25} = 261 ns$ ✓

D)

$h[(1-w) * t_c + w * t_m] + (1-h)[(\frac{B}{C} * t_m + t_c)(1-.25) + .25(t_m)]$

$.95[.75 \times 100 + .25 \times 1000] + .05[.75(\frac{8}{4} * 1000 + 100) + .25 \times 1000]$

$.95[325] + .05[1575 + 250]$

$\underline{308.75 + 91.25} = 400 ns$ ✓